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10/643,182	08/18/2003	Holger Claussen	2-11	3621

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Docket Administrator (Room 3J-219)
Lucent Technologies Inc.
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EXAMINER	
ETTEHADIEH, ASLAN	

ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 11/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/643,182	CLAUSSEN ET AL.	
	Examiner	Art Unit	
	Aslan Ettehadieh	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-7,9 and 10* is/are rejected.

7)☒ Claim(s) *3 and 8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 August 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/18/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because they replete numerous errors, A few examples are provided here: figure 1 does not show c,c' as disclosed in page 9 line 3 of specification; figure 1 shows four Tx modules on the transmitter side, however, on the receiver side the figure shows three Rx modules and one Tx modules; figure 1 shows 1r, 2r, 3r, 4r while disclosed in page 9 line 15 of specification is r_k (k = 1, ... n_r); figure 1 shows x^1, x^2, x^3, x^4 while disclosed in page 9 line 16 of specification is x_k ... x_{nT}); also if figure 2 is a diagrammatic illustration of operation of the receiver shown in figure 1, hen shouldn't figue 2 have five inputs and one output, for example the fifth input, which is the feedback of element 16 of figure 1, correspond to the figure 2; etc. Applicant's attention for carefully reviewing pending drawings for such other errors. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application

must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The abstract of the disclosure is objected to because "means (a,b,c, □)" is not clear. Correction is required. See MPEP § 608.01(b).

3. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

5. Claim 9 is objected to because of the following informalities: wherein "interleavers each operative to interleave the blocks from the associated encoder into a

respective data stream for modulating" does applicant mean respective data streams for modulating, where each encoder output has a separate data stream for modulation as seen in figure 1. Also please change "a second convolutional encoder operative to produce blocks of less significant bits" to "a second convolutional encoder operative to produce blocks of the less significant bits". Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. Claims 1 and 10 recites the limitation "the respective first soft estimate" and "the respective second soft estimate" in "a first combiner operative to provide adapted first soft estimates to the second processor, the adapted first soft estimates of each bit being dependent upon the respective first soft estimate and a respective previous first soft estimate; and a second combiner operative to provide third soft estimates back to the first processor for subsequent further decoding, the third soft estimates of each bit being dependent upon the respective second soft estimate and a respective previous second soft estimate". There is insufficient antecedent basis for this limitation in the claim. Does applicant mean to say a "a respective first soft estimate" and "a respective second soft estimate", or "the first soft estimate" and "the second soft estimate", etc.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 6, 7, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshadri et al. (US 6044073) in view of Ling (US 7106813).

8. Regarding claims 1, 7 and 10, Seshadri discloses a system operative to communicate digital data symbols with higher than quadrature phase shift keying (QPSK) modulation, the system comprising a transmitter and a receiver comprising: the transmitter comprising a modulator and means to split and encode the data into a first block of more significant bits of symbols and a second block of less significant bits of the symbols for modulating by the modulator (figure 3, col. 5 line 46 – col. 6 line 48, col. 9 lines 6 – 8). Seshadri also discloses the receiver being operative to receive digital data bits by iterative determination of soft estimates of bits as to what bit was intended (figure 5B, col. 9 line 24 – col. 10 line 31), the receiver comprising a first processor operative to provide first soft estimates of bits of the received signal (figure 5B element 512, col. 9 line 24 – col. 10 line 31); a second processor operative to decode the first soft estimates (figure 5B element 522, col. 9 line 24 – col. 10 line 31); a first combiner operative to provide adapted first soft estimates to the second processor (figure 5B element 518, col. 9 line 24 – col. 10 line 31); and a second combiner (figure 5B element 304, col. 9 line 24 – col. 10 line 31). Seshadri does not disclose the receiver being operative to receive digital data bits by iterative determination of soft estimates of bits followed by a hard decision as to what bit was intended, the receiver comprising a first processor operative to provide first soft estimates of bits of the received signal; a second processor operative to decode the first soft estimates and to provide second soft estimates of the bits; a first combiner operative to provide adapted first soft estimates to

the second processor, the adapted first soft estimates of each bit being dependent upon the respective first soft estimate and a respective previous first soft estimate; and a second combiner operative to provide third soft estimates back to the first processor for subsequent further decoding, the third soft estimates of each bit being dependent upon the respective second soft estimate and a respective previous second soft estimate.

In the same field of endeavor, however, Ling discloses the receiver being operative to receive digital data bits by iterative determination of soft estimates of bits followed by a hard decision as to what bit was intended (figure 1), the receiver comprising a first processor operative to provide first soft estimates of bits of the received signal (figure 1 elements 112, 114, figure 3 element 302, col. 5 lines 53 – 58, col. 6 lines 20 – 43; where the interference canceller to be implemented as a processor and wherein the canceller provides soft estimates); a second processor operative to decode the first soft estimates and to provide second soft estimates of the bits; a first combiner operative to provide adapted first soft estimates to the second processor, the adapted first soft estimates of each bit being dependent upon the respective first soft estimate and a respective previous first soft estimate; and a second combiner operative to provide third soft estimates back to the first processor for subsequent further decoding, the third soft estimates of each bit being dependent upon the respective second soft estimate and a respective previous second soft estimate (figure 1 element 116, figure 2 elements 206 – 208, 212, figure 3 elements 304 – 310, abstract, col. 2 lines 5 – 21, col. 5 lines 6 – 36, 53 – 65, col. 6 lines 40 – 48, col. 6 line 53 – col. 7 line 1; where the reference also discloses the decoder outputting log likelihood ratios (soft

estimates), which further requires the ratio of the previous iteration to compute the ratio of the current iteration). Ling further discloses performing a plurality of detection iterations each involving the first processor, second processor and the combiners are performed whereupon a hard decision is made (figure 1, feedback between elements 114 – 116, figure 2, element 210, col. 5 line 66 – col. 6 line 6). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Ling teaches implementing a decoder as a series iterative decoder comprising multiple decoders and the number of stages is a matter of design choice and can be implemented using two decoders, each as a processor and it would have been obvious to one skilled in the art at the time of invention was made to use the receiver being operative to receive digital data bits by iterative determination of soft estimates of bits followed by a hard decision as to what bit was intended, the receiver comprising a first processor operative to provide first soft estimates of bits of the received signal; a second processor operative to decode the first soft estimates and to provide second soft estimates of the bits; a first combiner operative to provide adapted first soft estimates to the second processor, the adapted first soft estimates of each bit being dependent upon the respective first soft estimate and a respective previous first soft estimate; and a second combiner operative to provide third soft estimates back to the first processor for subsequent further decoding, the third soft estimates of each bit being dependent upon the respective second soft estimate and a respective previous second soft estimate as taught by Ling in the system of Seshadri for optimizing communications receive channel coding gains (col. 3 lines 53 – 54).

9. Regarding claim 10, the steps claimed as method is nothing more than restating the function of the specific components of the apparatus as claim 1 and therefore, it is rejected as in considering the aforementioned rejection for the apparatus claim 1.

10. Regarding claim 6, Seshadri further discloses the modulation scheme is amplitude modulation (col. 13 lines 7 – 17), the first two bits of a symbol being provide by the first convolutional encoder, and the last two bits of a symbol being provided by the second convolutional encoder (col. 6 lines 45 – 48, col. 7 lines 9 – 14, figure 4; where a set of significant bits can be one, two, etc. and therefor the system can be a design choice to have the first bit of a symbol being provide by the first convolutional encoder, and the last bit of a symbol being provided by the second convolutional encoder, or he first two bits of a symbol being provide by the first convolutional encoder, and the last two bits of a symbol being provided by the second convolutional encoder, or etc.). Seshadri is not explicit about the modulation scheme is 16 Quadrature amplitude modulation, however it is well know in the art at the time the invention was made to use the modulation scheme of 16 Quadrature amplitude modulation to improve transfer rate and transmission reliability.

11. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seshadri et al. (US 6044073) in view of Ling (US 7106813) in further view of Gupta (US 2003/0112901).

12. Regarding claim 2, Seshadri further discloses the means comprises a first convolutional encoder operative to produce blocks of the more significant bits, a second convolutional encoder operative to produce blocks of less significant bits (figure 3, col. 5

line 46 – col. 6 line 48, col. 9 lines 6 – 8). Seshadri does not disclose respective interleavers each operative to interleave the blocks from the associated encoder into a respective data stream for modulating.

In the same field of endeavor, however, Gupta discloses system operative to communicate digital data symbols with higher than quadrature phase shift keying (QPSK) modulation, the system comprising a transmitter and a receiver comprising: a modulator and means to split and encode the data into a first block of bits of symbols and a second block of bits of the symbols for modulating by the modulator, the means comprising a first convolutional encoder operative to produce blocks of the bits, a second convolutional encoder operative to produce blocks of the bits, and respective interleavers each operative to interleave the blocks from the associated encoder into a respective data stream for modulating (figure 2B, paragraphs 37 – 40, 45).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use respective interleavers each operative to interleave the blocks from the associated encoder into a respective data stream for modulating as taught by Gupta in the system of Seshadri to provide diversity (paragraph 40).

13. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshadri et al. (US 6044073) in view of Ling (US 7106813) in further view of Applicant's Admitted Prior Art (hereinafter AAPA; US 2004/0038653).

14. Regarding claim 4, Ling further discloses the second processor is a convolutional decoder, the soft estimates being log likelihood ratios (col. 5 lines 6 –11). Ling does not disclose the first processor is a successive interference cancellation SIC multiple input

multiple output MIMO detector. AAPA does disclose the first processor is a successive interference cancellation SIC multiple input multiple output MIMO detector (paragraph 5), where it would have been obvious to one skilled in the art at the time of invention was made to use the first processor is a successive interference cancellation SIC multiple input multiple output MIMO detector as taught by AAPA in the system of Seshadri to combat interference (paragraph 5).

15. Regarding claim 5, Ling further discloses the first processor includes matched filters for detection (col. 3 lines 14 – 26, 57 – 67, col. 4 lines 62 – 67).

16. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Simon et al. (US 2003/0147471) in view of Cameron et al. (US 2002/0051499).

17. Regarding claim 9, Simon discloses a transmitter operative to send digital data symbols with higher than quadrature phase shift keying ("QPSK") modulation, the transmitter comprising a modulator and means to split and encode the data into a first block of more significant bits of symbols and a second block of less significant bits of the symbols for modulating by the modulator (figure 1, paragraphs 24 – 28; where even bits is being interpreted as more significant bits and where odd bits is being interpreted as less significant bits), the means comprising a first convolutional encoder operative to produce blocks of the more significant bits, a second convolutional encoder operative to produce blocks of less significant bits, and modulate each operative to modulate the blocks from the associated encoder into a respective data stream for modulating (figure 1, paragraphs 24 – 29). Simon does not disclose interleavers each operative to

interleave the blocks from the associated encoder into a respective data stream for modulating.

In the same field of endeavor, however, Cameron discloses a transmitter operative to send digital data symbols, the transmitter comprising a modulator and means to split and encode the data into a first block of more significant bits of symbols and a second block of less significant bits of the symbols for modulating by the modulator, the means comprising a first convolutional encoder operative to produce blocks of the more significant bits, a second convolutional encoder operative to produce blocks of less significant bits, and interleavers each operative to interleave the blocks from the associated encoder into a respective data stream for modulating (figures 2, 2B, 11A, 11B, paragraphs 14, 67, 70, 106, 108, 111 ; where the encoding in Cameron system is 2 bits for even and odd as also seen in Simon system).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use a transmitter operative to send digital data symbols, the transmitter comprising a modulator and means to split and encode the data into a first block of more significant bits of symbols and a second block of less significant bits of the symbols for modulating by the modulator, the means comprising a first convolutional encoder operative to produce blocks of the more significant bits, a second convolutional encoder operative to produce blocks of less significant bits, and interleavers each operative to interleave the blocks from the associated encoder into a respective data stream for modulating as taught by Cameron in the system of Simon to provide error free encoding (paragraph 18).

18. Claim 9 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Seshadri et al. (US 6044073) in view of Gupta (US 2003/0112901).

19. Regarding claim 9, Seshadri discloses a transmitter operative to send digital data symbols with higher than quadrature phase shift keying ("QPSK") modulation, the transmitter comprising a modulator and means to split and encode the data into a first block of more significant bits of symbols and a second block of less significant bits of the symbols for modulating by the modulator (figure 3, col. 5 line 46 – col. 6 line 48), the means comprising a first convolutional encoder operative to produce blocks of the more significant bits, a second convolutional encoder operative to produce blocks of less significant bits, and an interleaver operative to interleave the blocks from the associated encoders into a respective data stream for modulating (figure 3 elements 320, 324, col. 5 line 46 – col. 6 line 48, col. 9 lines 6 – 8). Seshadri does not disclose interleavers each operative to interleave the blocks from the associated encoder into a respective data stream for modulating.

In the same field of endeavor, however, Gupta discloses a transmitter operative to send digital data symbols with higher than quadrature phase shift keying ("QPSK") modulation, the transmitter comprising: a modulator and means to split and encode the data into a first block of bits of symbols and a second block of bits of the symbols for modulating by the modulator, the means comprising a first convolutional encoder operative to produce blocks of the bits, a second convolutional encoder operative to produce blocks of the bits, and interleavers each operative to interleave the blocks from

the associated encoder into a respective data stream for modulating (figure 2B, paragraphs 37 – 40, 45).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use interleavers each operative to interleave the blocks from the associated encoder into a respective data stream for modulating as taught by Gupta in the system of Seshadri to provide diversity (paragraph 40).

Other prior art cited

The prior art made of record and not relies upon is considered pertinent to applicant's disclosure.

20. Trott et al. (US 6735258) discloses a system where a signal demultiplexed to coders (including convolutional) and the coders produce steams of most significant bit, next significant bit, and least significant bit and then to a mapper to be mapped for transmission (figure 3).

Allowable Subject Matter

21. Claims 3 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aslan Ettehadieh whose telephone number is (571) 272-8729. The examiner can normally be reached on Monday - Friday, 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Aslan Ettehadieh
Examiner
Art Unit 2637

AE

KHAI TRAN
PRIMARY EXAMINER